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AREAL AND TIME DISTRIBUTIONS OF VOLCANIC FORMATIONS
ON MARS

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The analysis of igneous rock distribution has been fulfilled on the basis of the Geologic-morphological map of Mars at scale 1 : 5 000 000 compiled by G.N.Katterfeld (1972-85) according to the data obtained from interpretation of 1 : 2 000 000 scale pictures of „Mariner 9“, „Mars 4“, „Mars 5“, „Viking 1 and 2“. The following areological eras or groups have been distinguished as the stratigraphic basis for a martian time scale: I.Pre-Hellassian (PH), II.Hellassian (H), III.Elysian (E), IV.Amazonian (A), V.Olympian (O) /1, 2/. These 5 eras are subdivided into 14 periods (systems): 1. Ancient (PH₁), 2. Eridanian (PH₂), 3. Newtonian (PH₃); 4. Amphitritian (H₁), 5. Keplerian (H₂), 6. Phaethontian (H₃); 7. Acheronian (E₁), 8. Tharsidian (E₂); 9. Korolevian (A₁), 10. Alban (A₂), 11. Arcadian (A₃); 12. Arsian (O₁), 13. Pavonian (O₂), 14.Ascraean (O₃). These periods are, in turn, subdivided into more detailed epochs (sections), for example, early, middle and late Alban A₁, A₂, A₃; early, middle and late Arcadian A₁, A₂, A₃ /3/. The latest - Olympian era is crowned with the Modern epoch, represented by light rayed craters, barchan and dunes fields, and polar glacial depositions.

The area of volcanic eruptions and the number of eruptive centers are calculated on 10 x 10° cells and for the each areological eras: PH, H, E, A, and O. The largest area of eruptions happening at different times is related with Tharsis tectonic uplift. The summary area of martian basalts is 47 %, including 15 % for eruptive volcanic formations; the sum total of eruptive centers is 154 volcanoes. Almost half of igneous rocks area and of number of volcanoes dates from the Pre-Hellassian and Hellassian eras. The areas of Amazonian and Olympian volcanic formations are about 25 % each, and number of mapped eruptive centers for Olympian era is 14 (37 % from common number). The area of Elysian volcanic formations is more 1 %, and number of eruptive centers is 6 % from common number on Mars.

The study of distribution of igneous rock area and volcanic centers number on 10° sectors and zones revealed the concentration belts of volcanic formations. There are the greatest prevalence belts of volcanogenous formations along 108° W (meridian of major axis of triaxial martian ellipsoid) and 15°N, also the five meridional and three zonal belts along 5°, 65°, 95°, 245°, 295° W, and 35°N, 15°S, 65°S. The spaces between adjacent active belts are 30 ± 10°, 60 ± 10°, and 110°.

The most number of eruptive centers are observed in the sector of meridian 120° and in zone of parallel 65°S which coincide practically with „extremal“ meridian 108°W and parallel 62°S /4, 5, 6/.

Maximum area of igneous rocks of Olympian era is coincided with sector of meridian 135°W and zone of parallel 15°N. The most area of Amazonian volcanites are along meridian 115°W and parallel 45°N. The igneous formations of Hellassian era are concent-

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rated in the South hemisphere and subequatorial zone of planet. The maximum area of volcanic rocks of Hellasian is observed in sector of meridian 65°W and zone of parallel 62°S.

The belts of maximum prevalence of volcanic formations in course of areological time moved from the East to the West and from subpolar regions to equator. I.e., favourable for volcanic eruptions tectonic conditions for the early stages of planetary evolution took place in subpolar regions of relatively tectonic contraction, but the volcanites of late stages are formed mainly in subequatorial zone with relatively tectonic expansion of planet (canal Agathodaemon = rift valleys Marineris).

Noteworthy, the 20° equatorial zone itself is characterized as belt with the moderate areal disposition of volcanic rocks and eruptive centers.

The planetary area of Olympian volcanic formations with the NW and NE orientations is connected with Tharsis tectonic uplift. The major tectonic and volcanic heights of Mars (and of all planetary solar system, at all) are linked to Tharsis. The Tharsis mountain massif and framing regional tectonic structures are as framework control for disposition of the major volcanic regions of planet. There are here the characteristic zonal-concentric pattern of volcanic rocks disposition, and typical Radial System of disjunctive dislocations, including major faults, rift valleys and lineaments. The Tharsis is volcanic-tectonic Radial-Concentric System of Mars, with periodical activity. In Hellasian era Tharsis was as large, relatively unamplitude positive structure with the vast display of volcanic processes. The differentiation with decrease of uplift area but with increase of uplift heights is happened in the following epochs of volcanic-tectonic activation. In Olympian era took place the intensification of volcanic activity on the background of contrasting uplift of tectonic systems and volcanic centres of Tharsis that reached the heights of 27 km.

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